AF/3742

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Docket No. BFGH.P0265US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicants:	Kevin C. Schramm
Application No.:	09/652,624
For:	AIRCRAFT HEATED FLOOR PANEL
Filing Date:	August 31, 2000
Examiner:	John A. Jeffery
Art Unit:	3742

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This brief is being submitted in connection with the appeal of the above-identified application.

I. REAL PARTY IN INTEREST

The real party in interest in the present appeal is Goodrich Company, the assignee of the present application.

II. RELATED APPEALS AND INTERFERENCES

Appellants, appellants' legal representatives, and/or the assignee of the present application are unaware of any appeals or interferences which will directly affect, which

will be directly affected by, or which will have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-15 and 19-28 are pending in the application, stand finally rejected, and are the subject of this appeal. A clean listing of the claims is attached as Appendix A.

IV. BACKGROUND OF INVENTION

An aircraft will commonly include heated floor panels in order to maintain the cabin at a comfortable temperature. The floor panel is typically supported by an aircraft structure and has a structural integrity sufficient to support the weight of people and objects resting on top thereof. A metal face sheet typically forms the top surface of the panel to protect the underlying layers from punctures from high heels, chips from dropped objects, scratches from dragged luggage and/or other floor-traffic related hazards.

An aircraft heated floor panel is usually made by compiling a series of layers together to form a lower support level and an upper heater level. The lower support level may include, for example, a honeycomb layer surrounded by reinforcing fiber layers. The upper heater level may include, for example, a resistance element disposed in layers of a thermosettable dielectric material. High temperature film adhesives and scrims are appropriately provided between the layers and the compiled layers are cured at an elevated temperature (often in excess of about 250° F) to form a composite structure.

The composite structure is then cooled to room temperature and the metal face sheet is secured to the previously cured layers in a separate manufacturing step. Specifically, for example, an epoxy cross-link adhesive may be used to bond the metal face sheet to the top of the heater. The secured metal face sheet may then be cut/trimmed to the correct size and an appropriate surface treatment (e.g., paint, primer, anodizing, etc.) may be applied.

V. SUMMARY OF INVENTION DEFINED IN THE CLAIMS ON APPEAL

Appellant's invention provides a floor panel 10 for installation in an aircraft 12. The floor panel 10 is provided in order to maintain the aircraft cabin at a comfortable temperature and is supported around its perimeter by aircraft structure 14. (See Figure 1, below.) A metal face sheet 16 (*e.g.*, aluminum) forms the top surface of the panel 10 to protect the underlying layers 18 against punctures from high heels, chips from dropped objects, scratches from dragged luggage and/or other floor-traffic related hazards.[1]

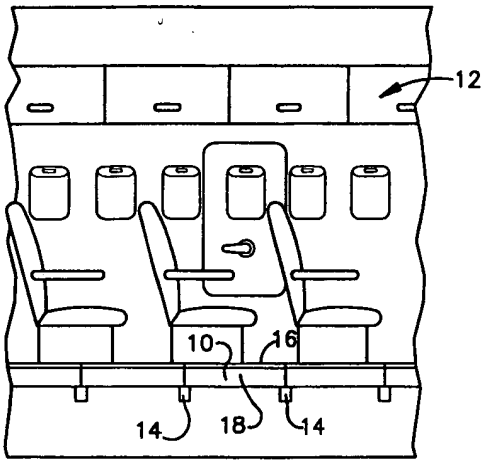

FIGURE 1

The underlying layers 18 of the panel 10 form a lower support level 20 and an upper heater level 22.[2] The support level 20 may be formed from a honeycomb layer 24 (*e.g.*, aramid) sandwiched between fiber layers 26 (*e.g.* carbon fiber prepreg) and fiber layers 28 (*e.g.*, fiberglass epoxy prepreg). The heater level 22 may be an electrothermal heater, that is it may comprise an electrically resistive element electrically isolated in a dielectric.[3] (See Figure 2, below.)

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1. Page 3, line 23 through page 4, line 2.

2. The underlying layers 18 may include an adhesive layer 30 between the support level 20 and the heater 22.

3. Page 4, line 5 through page 5, line 22.

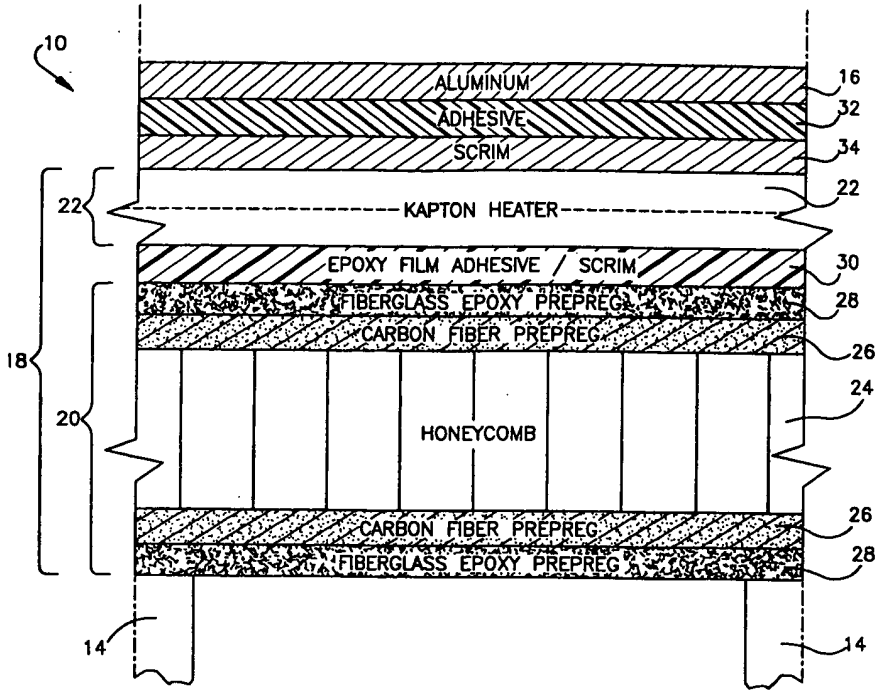

Figure 2

The floor panel 10 includes an adhesive layer 32 between the underlying layers 18 and the metal face sheet 16. According to the present invention, this adhesive layer 32 is an adhesive which retains elasticity after bonding, specifically a pressure sensitive adhesive (PSA) which is activated by the application of pressure and which performs appropriately during elevated curing temperatures.[4]

To make the floor panel 10, the layers 18 of the lower support level 20 and the upper heater level 22 are compiled. The pressure sensitive adhesive layer 32 is then applied to the top surface and the metal face sheet 16 placed on top of the layer 32. The support/heater layers 18 are then subjected to a curing process at an elevated temperature (*e.g.*, in excess of about 250° F) and, at the same time, pressure may be applied to activate the pressure sensitive adhesive layer 32. During the heat curing, the metal face plate 16 expands outwardly due to the differences in the thermal expansion rates between the support/heater layers 18 and the metal sheet 16. As the panel 10 is subsequently cooled to room temperature (*e.g.*, heat is removed and the panel is allowed to cool), the retained elasticity of the adhesive layer 32 allows the bonded metal

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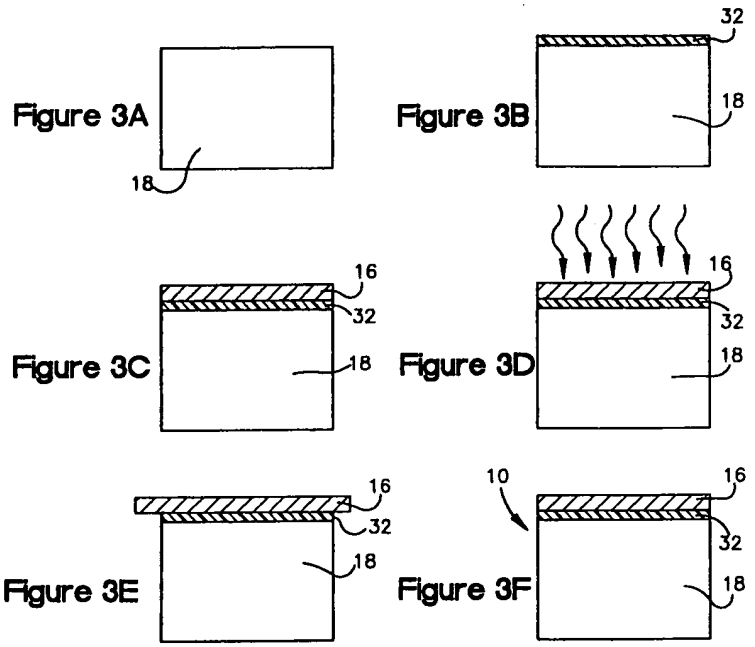
4. Page 4, line 27 through page 5, line 2.

face sheet 16 to contract inwardly without warping. (See Figures 3A - 3F, below.) Additional manufacturing steps can be streamlined as well. For example, the metal face sheet 16 can be cut to a net shape and treated with the appropriate surface treatment and then bonded to the other layers 18 in one step.[5]



Because pressure sensitive adhesives retain elasticity after bonding, the metal face sheet 16 is allowed to contract inwardly as the panel 10 is cooled to room temperature. Additionally, the thickness of the pressure sensitive adhesive layer 32 may be varied to accommodate different curing temperatures. Generally, the greater the thickness, the higher curing temperature that may be used. For example, a thickness of 0.010 inch would correspond to a curing temperature of about 280°F.

VI. ISSUES

A. Whether claims 1, 4, 6, 10, and 19-23 are patentable under 35 U.S.C. §103 over U.S. Patent No. 3,697,728 to Stirzenbecher in view of U.S. Patent No. 4,374,312 to Damron.

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5. Page 5, line 6 through 19.

B. Whether claims 1, 3-4, 6-10, and 19-25 are patentable under 35 U.S.C. § 103 over U.S. Patent No. 2,512,875 to Reynolds in view of Stirzenbecher, CA721834, and further in view of Damron.

C. Whether claims 2 and 5 are patentable under 35 U.S.C. § 103 over Reynolds in view of Stirzenbecher, CA721834, Damron, and further in view of "Flight International" article entitled "New Carbon Composite Material Developed," or alternatively, Stirzenbecher in view of Damron and further in view of "Flight International: articles entitled "New Carbon Composite Material Developed."

VII. GROUPING OF CLAIMS

For the purposes of this appeal only, the claims stand or fall as follows:[6]

A. Claims 4, 6 and 10 stand or fall with independent claim 1, claims 20-23 stand or fall with independent claim 19.

B. Claims 3, 4, 6-10 stand or fall with independent claim 1, claims 20-25 stand or fall with independent claim 19.

C. Claims 2 and 5 do stand or fall with each other.

VIII. ARGUMENT

For the following reasons, claims 1-15 and 19-28 are believed to be patentable over the applied art.

Issue A

Claims 1, 4, 6, 10, and 19-23 are rejected as being obvious over U.S. Patent No. 3,697,728 to Stirzenbecher in view of U.S. Patent No. 4,374,312 to Damron.

Stirzenbecher discloses a panel 10 comprising a honeycomb glass fiber core 12, a heating element 22 consisting of resistive foil 24 embedded in an electrically insulating sheet 26, and cover sheets 14 and 16. (See Figure 1, below.) It may be noted for future reference that the heating element 22 is contained in an upper recess

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6. This grouping is conditioned upon the Examiner not entering any new grounds of rejection and/or any new points of argument.

of the core 12 so as to provide "upstanding peripheral flanges that protect the edges of the element."[7]

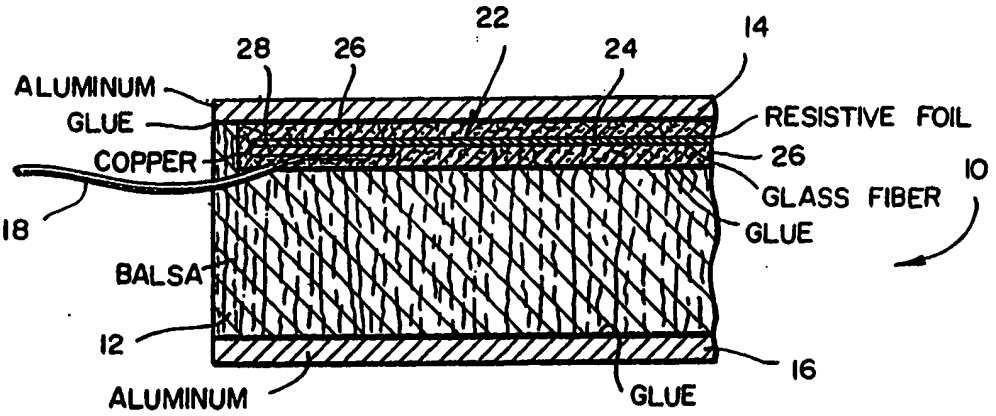

FIG. 1

The Examiner appears to contend that the cover sheet 16 and the honeycomb core 12 comprise a "lower support level" and that the resistive foil 24 comprises an "upper heater level." Be this as it may, Stirzenbecher still does not show or suggest an aircraft heated floor panel comprising "a plurality of layers cured together to form a lower support level and an upper heater level" as set forth in independent claims 1 and 19. While the abstract implies that the honeycomb core 12 and the heating element 22 form a "subassembly," the detailed description clarifies that this "subassembly" is formed when "the lower surface of the sheet 26 is secured, as by an adhesive, to the upper surface of the core 12."[8] Damron (discussed below) does nothing to cure this shortcoming.

Damron discloses a portable heating apparatus 10 comprising a heating element 12 (*i.e.*, a planar sheet of electrically conductive paper 14), a panel member 34 (*i.e.*, the main structural and insulating member), a front panel cover member 42, and a

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7. Stirzenbecher, column 8, lines 50-53.

8. Stirzenbecher, column 8, lines 43-46.

perimeter frame 50. (See Figures 1 and 5, below.) The front panel cover member 42 can be made of a laminated plastic (*e.g.*, Formica) and its front face 44 can be provided with a decorative finish to enhance the visual appeal of the apparatus 10."[9] The frame 50 includes a handle 51 for attaching the heating apparatus to any vertical surface, hanging the heating apparatus in various locations, and serving as a means of carrying the heating apparatus from one location to another. (See Figure 5, below.)

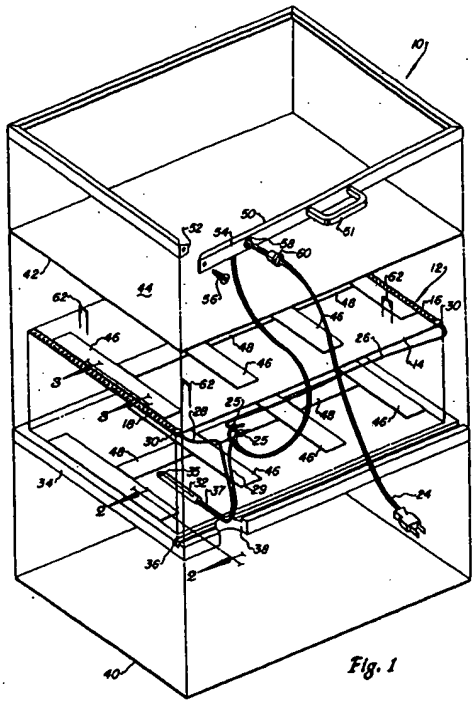

Fig. 1

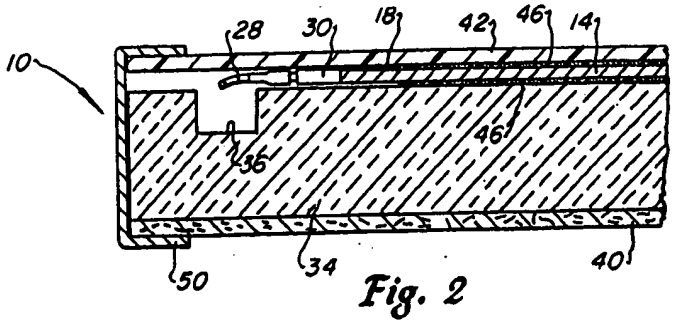

Fig. 2

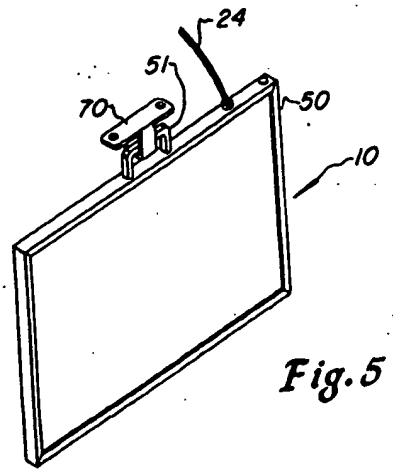

Fig. 5

The heating element 12 is sandwiched between the panel member 34 and the cover member 42 and secured thereto by rectangular strips of tape 46 and 48. (See Figures 1 and 2, above.) The Damron patent notes that:

> The use of the spaced apart strips of tape 46 and 48 on opposite faces of the heating element 12 assures that, in assembly with the panel members 34 and 42, the paper member 14 remains in a flat and secure position between

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9. The cover member 42 also may be made of mirrored glass.

> the panel members. Moreover, in the event that it is necessary to replace the heating element 12, the cover member 42 may be easily removed from the heating element and the heating element itself may be conveniently and easily removed from the main panel member 34.[10]

The Examiner contends that it would have been obvious to provide the Stirzenbecher panel with "a pressure sensitive adhesive so that the element and support remains in a flat and secure position between the panel members." However, the applied art does not provide any suggestion that the Stirzenbecher heating element 22 does not remain flat and/or secure. This is especially true in view of the recessed mounting of the heating element 22 within the honeycomb core 12. Accordingly, the applied art does not show or suggest "a pressure sensitive adhesive bonding the metal face sheet to the underlying support/heater layers" as set forth in claim 1 and/or "an elastic adhesive bonding the face sheet to the underlying support/heater layers whereby the different rates of thermal expansion may be accommodated during curing procedures" as set forth in claim 19.

Moreover, Damron teaches that "flatness" and "secureness" is accomplished by using tape strips to secure the bottom side of the heating element 12 to the panel member 34 and the top side of the heating element 12 to the cover member 42. This certainly would teach against "a plurality of layers cured together to form a lower support level and an upper heater level."

Issue B

Claims 1, 3, 4, 6-10, and 19-25 are rejected as being obvious over U.S. Patent No. 2,512,875 to Reynolds in view of Stirzenbecher, and further in view of Damron. Reynolds discloses a heating panel which is used as a wall piece in a "radiant heating system" and which is especially designed "to provide insulation particularly effective to prevent loss through the compartment walls by radiation itself." To this end, the Reynolds panel comprises a honeycomb core 10 having opposed surface sheets 11 and 12, a resistance element 16 positioned between electrically-insulating (*e.g.* paper)

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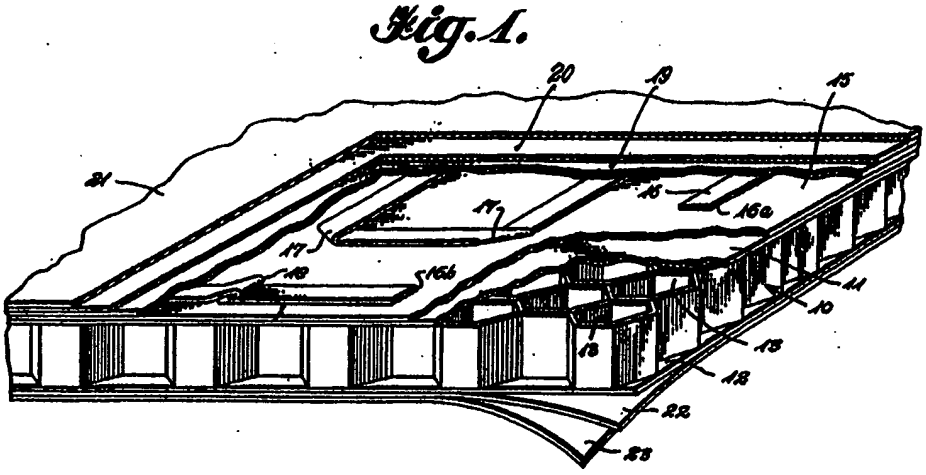
10. Damron, column 5, lines 43-52.

sheets 15 and 19, a heat distributing (*e.g.*, aluminum foil) sheet 20 overlying the sheet 19, and a decorative (*e.g.*, wall paper) layer 21 which constitutes the radiating face of the panel. (See Reynolds Figure 1, below.)



To assemble the Reynolds panel, the paper sheet 15 is adhesively secured to the honeycomb sheet 11. The resistance element 16 is then adhesively secured to the paper sheet 15[11], the sheet 19 is adhesively secured to the outer surface of the element 16 and to the exposed portions of the sheet 15, and the heat distributing sheet 20 is adhesively secured to the sheet 19. Accordingly, Reynolds does not appear to show or suggest an aircraft heated floor panel comprising "a plurality of layers cured together to form a lower support level and an upper heater level" as set forth in independent claims 1 and 19. As explained above, Stirzenbecher also lacks these features of the invention and Damron does not cure this shortcoming in the proposed Reynolds/Stirzenbecher combination. For this reason alone, the claims are believed to be patentable over the applied art.

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11. Reynolds specifically states that "the sheet 15 is preferably provided with a relatively thick coat of adhesive material and the resistance element 16 is positioned thereon while the adhesive material is still wet or tacky. When the element 16 is positioned over the entire panel, an electric current is passed therethrough to heat the element. Such heating results in linear expansion of the element with resultant "buckling" at spaced points along its length. Such buckled portions then pressed down into such folds as suggested at 18 and thereafter comprise suitable expansion joints for the element 16."

Furthermore, neither Reynolds nor Stirzenbecher teaches "a pressure sensitive adhesive bonding the metal face sheet to the underlying support/heater layers" as set forth in claim 1 and/or "an elastic adhesive bonding the face sheet to the underlying support/heater layers whereby the different rates of thermal expansion may be accommodated during curing procedures" as set forth in claim 19. The Examiner contends that it, in view of Damron, it would have been obvious to provide the Reynolds panel with "a pressure sensitive adhesive so that the element and support remains in a flat and secure position between the panel members." However, Reynolds already addresses (and seems to solve) "flatness" issues when assembling the resistance element 16 to the "supporting structure" whereby the Examiner's proposed modification would not seem to be necessary.[12]

Issue C

Claims 2 and 5 are rejected as being obvious over Reynolds in view of Stirzenbecher, CA721834, Damron, and further in view of "Flight International" article entitled "New Carbon Composite Material Developed," or alternatively, Stirzenbecher in view of Damron and further in view of "Flight International" article entitled "New Carbon Composite Material Developed." These further secondary references do nothing to cure the shortcomings in Reynolds, Stirzenbecher and/or Damron, whereby dependent claims 2 and 5 are believed to be patentable for at least this reason.

IX. CONCLUSION

In view of the foregoing, appellant respectfully submits that the claims are patentable over the applied art and that the final rejection should be reversed. This brief is being submitted in triplicate along with a check in the amount of $330.00 to cover the fee for filing this brief in support of the appeal.[13]

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12. Again, Damron teaches that "flatness" and "secureness" is accomplished by using tape strips to secure the bottom side of the heating element 12 to the panel member 34 and the top side of the heating element 12 to the cover member 42. This certainly would teach against "a plurality of layers cured together to form a lower support level and an upper heater level."

13. Should a petition for an Extension of Time be necessary for the timely filing of this brief (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR

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CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper or item referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first-class mail in an envelope addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: 11/21/03

Christine M. Starcovic

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fees (including additional claim fees) to Deposit Account No. 18-0988, Order No. BFGH.P0265US.

APPENDIX A

1. An aircraft heated floor panel, comprising:

a plurality of layers cured together to form a lower support level and an upper heater level;

a metal face sheet for protecting the top of the panel from floor-traffic related damage; and

a pressure sensitive adhesive bonding the metal face sheet to the underlying support/heater layers.

2. An aircraft heated floor panel as set forth in claim 1, wherein the support layer includes a honeycomb layer sandwiched between fiber layers.

3. An aircraft heated floor panel as set forth in claim 1, wherein the heater level comprises a resistive element encapsulated in cured thermoset plastic plies.

4. An aircraft heated floor panel as set forth in claim 1, wherein the metal face sheet is made of a metal selected from aluminum, titanium, steel, or stainless steel.

5. An aircraft heated floor panel as set forth in claim 1, wherein the support layer includes a honeycomb layer sandwiched between fiber layers, the heater level comprises a resistive element encapsulated in cured thermoset plastic plies, and the metal face sheet is made of aluminum.

6. An aircraft heated floor panel as set forth in claim 1, wherein the underlying support/heater layers include a high temperature curing adhesive layer between the support level and the heater level.

7. An aircraft heated floor panel as set forth in claim 1, wherein the pressure sensitive adhesive is an acrylic pressure sensitive adhesive.

8. An aircraft heated floor panel as set forth in claim 1, wherein the pressure sensitive adhesive is a rubber pressure sensitive adhesive.

9. An aircraft heated floor panel as set forth in claim 1, further comprising a primer to enhance the bonding characteristics of the adhesive.

10. In combination, an aircraft and the aircraft heated floor panel of claim 1, wherein the perimeter of the lower support level is supported by a structure of the aircraft.

11. A method of making the aircraft heated floor panel of claim 1, said method comprising the steps of:

applying a layer of the pressure sensitive adhesive to the top of the heater level,

placing the metal face sheet on top of the adhesive layer,

curing the support/heater layers and the metal face sheet at an elevated curing temperature, and

cooling the cured layers and the metal face sheet to an ambient temperature;

wherein the pressure sensitive adhesive layer allows the metal face sheet to expand and contract at a different thermal expansion rate than the support/heater layers during the curing and cooling steps.

12. A method as forth in claim 11, wherein the curing temperature is at least about 250° F.

13. A method as set forth in claim 11, wherein the layer of the pressure sensitive adhesive is about 0.010 inch and wherein the curing temperature is about 280° F.

14. A method as set forth in claim 11, wherein the face sheet is cut to net shape prior to the curing step.

15. A method as set forth in claim 11, wherein a surface treatment is applied to the face sheet prior to the curing step.

19. An aircraft heated floor panel, comprising:

a plurality of layers cured together to form a lower support level and an upper heater level, these support/heater layers together having a certain rate of thermal expansion;

a face sheet for protecting the top of the panel from floor-traffic related damage, the face sheet having a different rate of thermal expansion than the underlying support/heater layers; and

an elastic adhesive bonding the face sheet to the underlying support/heater layers whereby the different rates of thermal expansion may be accommodated during curing procedures.

20. An aircraft heated floor panel as set forth in claim 19, wherein the face sheet has a higher rate of thermal expansion than the underlying support/heater layers.

21. An aircraft heated floor panel as set forth in claim 20, wherein the face sheet is made of metal.

22. An aircraft heated floor panel as set forth in claim 21, wherein the metal is selected from aluminum, titanium, steel, or stainless steel.

23. An aircraft heated floor panel as set forth in claim 21, wherein the elastic bonding adhesive is a pressure sensitive adhesive.

24. An aircraft heated floor panel as set forth in claim 23, wherein the pressure sensitive adhesive is an acrylic pressure sensitive adhesive.

25. An aircraft heated floor panel as set forth in claim 23, wherein the pressure sensitive adhesive is a rubber pressure sensitive adhesive.

26. A method of making the aircraft heated floor panel of claim 19, said method comprising the steps of:

applying a layer of the elastic bonding adhesive to the top of the heater level;

placing the face sheet on top of the adhesive layer;

curing the support/heater layers and the face sheet at an elevated curing temperature to form a composite structure; and

cooling the composite structure to an ambient temperature;

wherein the elastic bonding adhesive layer allows the face sheet to expand and contract at a different thermal expansion rate than the support/heater layers during the curing and cooling steps.

27. A method as set forth in claim 26, wherein the face sheet is cut to net shape prior to the curing step.

28. A method as set forth in claim 26, wherein a surface treatment is applied to the face sheet prior to the curing step.